



University of Colorado **Anschutz Medical Campus**



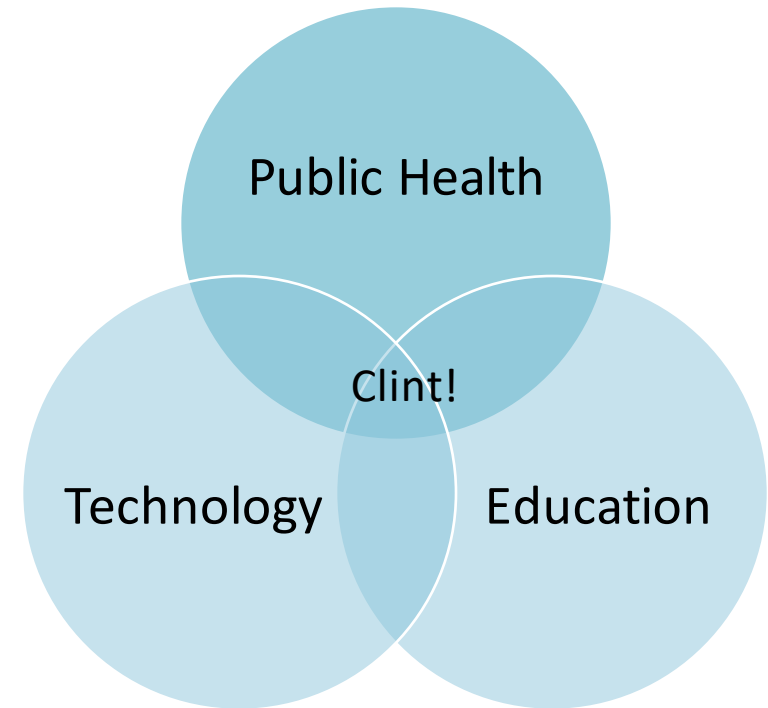
Social-Emotional VR Avatars

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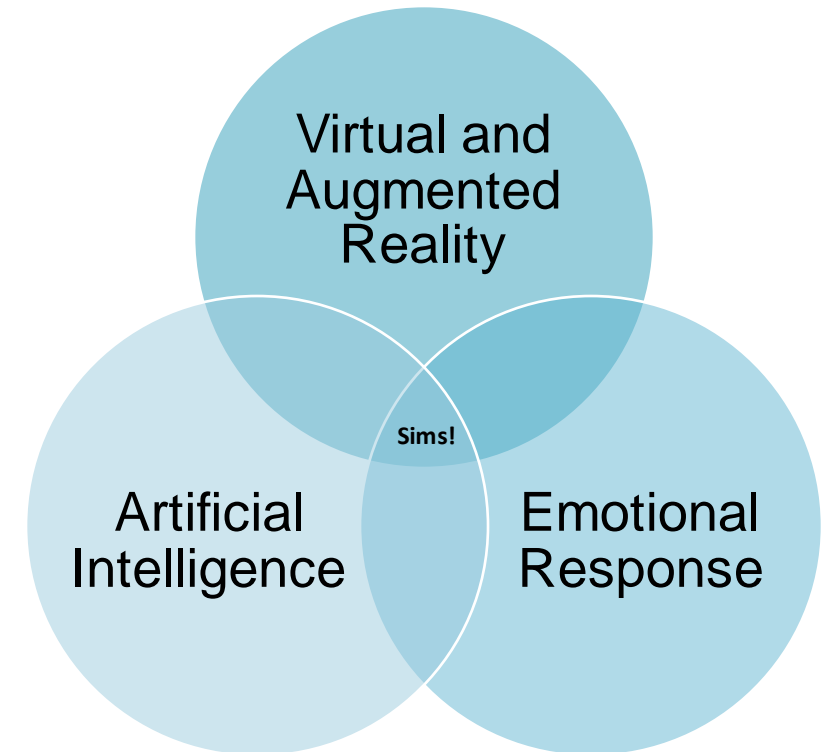
Clint Carlson

- Background in Public Health (WHO), Education, & Technology
 - Human Interaction with simulation technology, 3D Modeling, and international education capacity building.
- Passionate about technology that builds capacity and provides purpose for life-long learning and altruism.
- <https://www.linkedin.com/in/clintcarlson/>



Quick Definitions

- [Virtual Training Suite \(VTS\)](#) - Development platform
- VR/AR
 - VR – Virtual Reality- Fully immersive simulations within a computer-generated world.
 - AR – Augmented Reality- Overlaps simulation with the real world.
- A.I. – Artificial Intelligence - Artificial intelligence is the simulation of human intelligence in machines. There are many branches of A.I. but we'll be focusing on conversational AI.
- Avatars – Simulated representations of humans within an XR environment



Social Emotional VR/AR Avatars

- Simulation for training of human interactions in safe, non-judgmental virtual scenarios using Virtual Training Suite
- Range of non-verbal emotional responses and change in vocal tone connected to each emotion.
- Can take place in a virtual office, on campus, or asynchronously off site.
- Customizable towards any complex scenario created by faculty, staff, or students!



Hi there! My name is Karen. I am an avatar designed to introduce you to the Emotional Avatars being created at the University of Colorado - Anschutz Medical Campus.

Focus on Emotion

- Reactive verbal and non-verbal communication
 - What is said
 - How it is said (tone of voice)
 - Multi-directional
 - Facial expressions and body postures
 - All emotions escalate up and down
 - Joy +1 turns to Joy +2
 - Anger +1 turns to Joy +1
 - Indecision +1 turns to Fear +1
- <https://xr.cuanschutz.edu/intro/>



VR Avatars for Everyone!

- Addressing the need to improve soft-skills, improvisation, and conversation confidence in Public Health with an emphasis on mental health via experiential learning.
 - Students
 - Faculty
 - Trainees
 - Social Workers
 - Parents
 - Counselors
 - First Responders
 - High School Nurses
 - Mechanics
 - You get the idea... avatars are for everyone!



Current Success

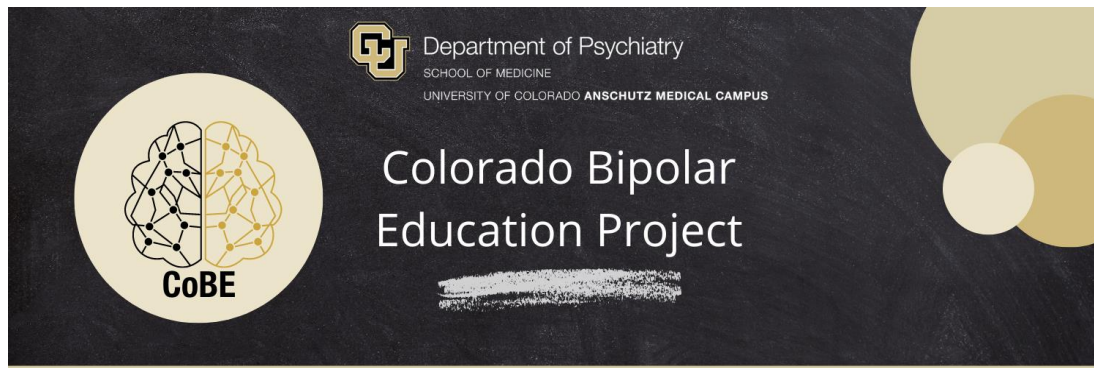
- School Nurse Training for Conversations with Vaccine Hesitant Parents
- CoBE (Colorado Bipolar Education Project)
 - James & Alyssa #1 – First meeting with couple. James is depressed. Alyssa, his partner is trying to get him help
 - Navigation of conversation and the dynamic of 2 people in the room
 - James & Alyssa #2 – #1 Follow-up meeting. Life has happened in between then and now...
- Detained Patient De-escalation – Being created to train hospital employees tactics to defuse situations with very angry and sometimes violent patients.
- Motivational Interviewing - Created to add interaction to what have been scripted videos to watch in the past. Very good platform for the deliberate process of Motivational Interviewing.
- ECHO - Improving Equity in Menopause - Series of conversations with women of various backgrounds, each approaching menopause in their own way.
- Pediatric Substance Abuse Conversations - Colorado Access and Denver Health in partnership with Denver Health's Center for Addiction Medicine (CAM) Academy
- Preparing Students for Advocacy Conversations with Lawmakers
- All here! - <https://xr.cuanschutz.edu>

Motivational Interviewing

Behavioral Health & Wellness Program

- <https://miro.com/app/board/uXjVPXDeln8=/>
- <https://xr.cuanschutz.edu/mi/engaging/>
- Following the proper process of M.I., you will help Maria uncover her own motivation to quit smoking.





- https://miro.com/app/board/uXjVOuo8wIc=?share_link_id=586512068448
- <https://xr.cuanschutz.edu/bipolarmasterclass/>
- Introduces "followup appointments"
 - Simulation 2 takes place a week later.
 - Patient memory
 - Life happening in that week



De-escalation Techniques

Behavioral Health Services, Denver Health

- <https://miro.com/app/board/uXjVOsH2jQ4=/>
- <https://xr.cuanschutz.edu/deescalation/>
- Simulation starts very intense
- Patient will threaten you with violence and says he will "punch you in the f***** face"
- Demands to see a "real doctor"



Menopause Equity

School of Pharmacy Partnership

- https://miro.com/app/board/uXjVOsH2jQ4=
- <https://xr.cuanschultz.edu/echo/>
- Wide diversity of patients
- Translator



Mini-Workshop

- Choose Avatars
 - Choose Environment
-
- Human Script Creation (Mad Libs!)
 - AI Script Creation using ChatGPT
 - Prompt: Generate 3 different branching scenario conversations about a Cuban woman named Christina who is approaching menopause. Christina is 45 years old and primarily speaks Spanish. One scenario should be joyful, another upsetting, and a 3rd somewhere in between. Each scenario should have 3 responses of dialog and is aimed at a medical audience.
 - ▶ Generated Script:
 - ▶ <https://docs.google.com/document/d/1DZBNCJc1WJ2nVdgagJitYEaEnDhvg1lyJ8HyTokAVQ/edit?usp=sharing>
 - ▶ Pushing script into Miro Board to fine tune
 - ▶ Miro to VTS
 - ▶ Add Voices and Publish!

Meeting Learners Where They Are

- Assessment
 - From full VR to basic web pages access
 - Fully remote
 - Fully repeatable
 - Big learner data & dashboards
 - Each step
 - Full simulation
 - Multi-simulations
 - Easy logistical advantages over
 - Actors differing each time
 - Difficult to schedule
 - Difficult to repeat
 - Difficult to provide feedback & assess
- Standardization
 - Unlimited learners can run through the same/various simulation(s) unlimited times
 - Gamification allows learners to "fail upwards" as they learn what happens when taking a wrong turn on purpose.
- Personal and Remote
 - Learners can run through the simulations unlimited amount of times from anywhere. All Simulations work in VR but are also built to work in basic web browsers with no apps to download. EQUITY!

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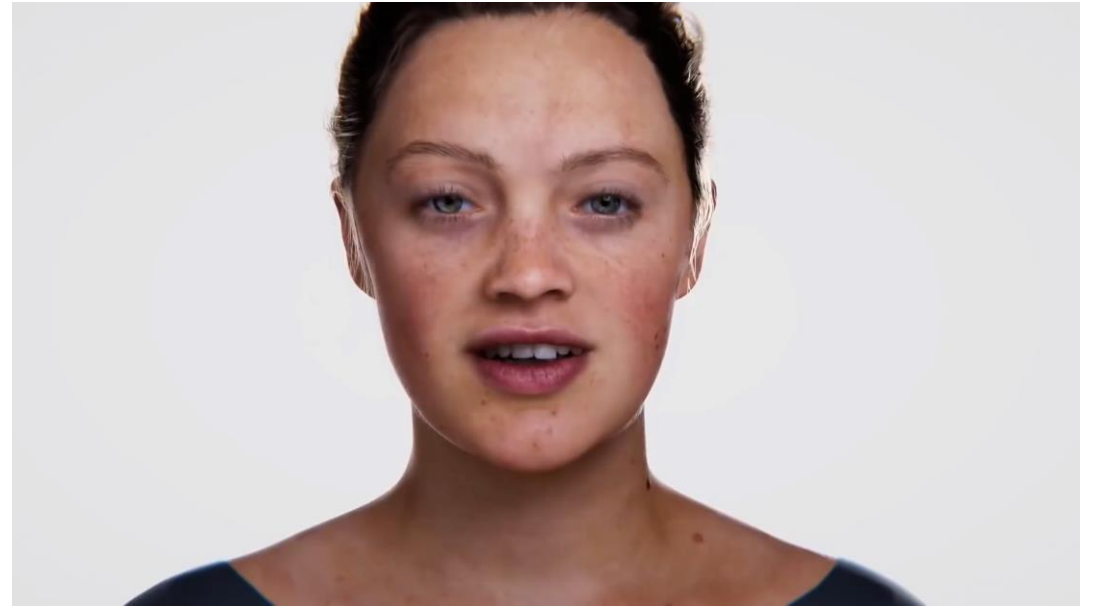
Deep-er Goals

- **Develop a dedicated avatar simulation with a focus on public/mental health**
 - Simulation of reality
 - Follow-up appointments – patients change as circumstances in their lives change (car broken down, child gets into college)
 - Conversation and treatment at 14yo, 16, 19, 22, 35, 55, end of life - how does treatment and conversation change over the span of one's life?
 - Conversation recall – Avatars recall past conversations and may even mis-remember the conversation or context
- **Including a wide range of overlapping emotions**
 - Communicated by verbal (content and emotional audio) and non-verbal (body posture, eye contact).
- Broader use of A.I.
 - To allow for natural speak to avatars (as opposed to choosing a predefined selection)
- Assessment & Feedback
 - Standardized simulations for large groups of learners
 - Learner profiles connected with progress & data
 - Big picture learner analytics based on module or larger data sets
- [Realistic High Resolution](#)
 - Simulations can be created with very high realism

Avatar Realism on the Horizon



https://twitter.com/joshua_xu_/status/1689019874667024384?s=20

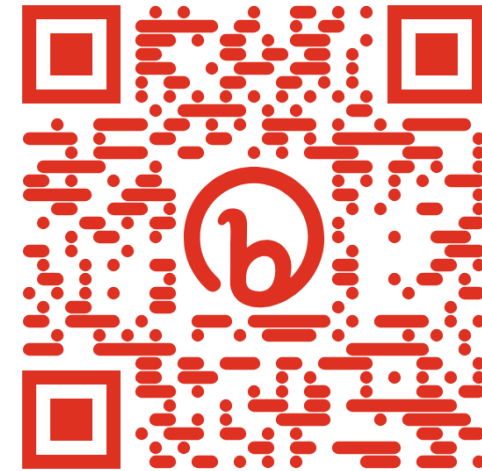
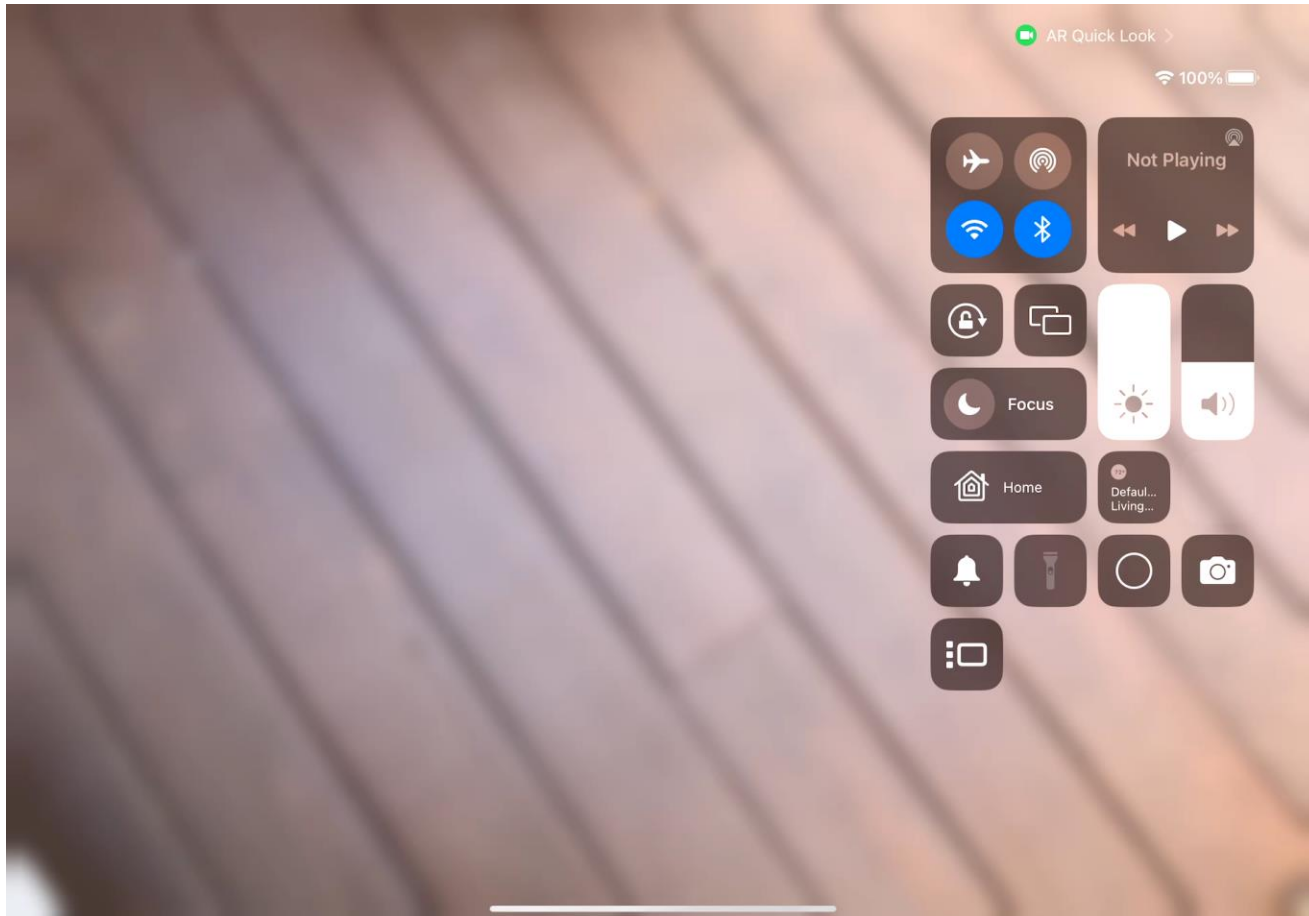


<https://www.youtube.com/watch?v=sFibYevZ-Fo>

Deep-er-er Goals

- Create machine learning profiles of how individuals communicate and better connect communication styles of doctors and patients.
 - Gathering data on speech language and vocal patterns
 - length of words/sentences
 - Rate of speech
 - Blood pressure
 - Eye contact
 - Body posture
- Avatars with further, compounding emotional triggers
 - Stressed by holidays, days of the week, anniversary of various events, weather, current events, etc.
- Used to assess current skills as part of student acceptance into various programs (incoming student idea!)
- Deeper-er AI. ChatGPT prompts and responses without a human scripting
- AR Real World Placement
 - Using AR, we can position avatars anywhere on earth using GPS and WiFi coordinates. Avatars in rooms waiting for you to continue the conversation.
 - Avatars may be placed anywhere (GPS in the code) on earth, allowing for additional realism of timing and the unexpected

AR Avatar Example



bit.ly/3YBUK8L

Aiming where this technology is headed

- VR will replace computers
- AR will replace phones
- Apple Vision Pro– Glasses that replace phone screen
 - Overlay with patient information – medical records, family history, access to other medical information without breaking eye-contact with your patient – EASY STUFF!
 - And Maps, Calendars, distance to things...
 - Night vision and adaptive prescriptions.
 - 3D Model of brains or *anything*
 - Avatars sitting in the room with you!
- The future of AR/VR is affordable, portable and very personal.



The inevitable ubiquity of A.I.

- <https://scenescape.github.io/> - Text to 3D scene
- <https://maketafi.com/newsroom> - Text to 3D Character
- [Make ChatGPT Speaks with Speechki Plugin](#)



Discussion

- How can/will avatar simulation and human interaction to support learner skill development and deepen the conversation around patient care?
- What applications for this technology do you see in your workplace?
- What emerging technologies do you think may overlap with Social-Emotional Avatars?
- How could projects like this change education and training?





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